Technical Information

Liquisys M COM223F/253F

Dissolved Oxygen Measurement
Transmitter for oxygen sensors

Application

The modular design of the transmitter allows easy adaption to a variety of customer requirements. Starting with the basic version for "measurement and alarm generation", the transmitter can be equipped with additional software and hardware modules for special applications. These modules can also be retrofitted as required.

Application

- Process control in enzyme production
- Control of culture preparation
- Biotechnological production

Your benefits

- Field or panel-mounted housing
- Universal application
- For analog and digital sensors
- Simple handling
  - Logically arranged menu structure
  - Simple single-point calibration in air or in air-saturated water
- Safe operation
  - Excellent interference immunity
  - Direct access for manual contact control
  - User-defined alarm configuration

The basic unit can be extended with:

- 2 or 4 additional contacts for use as:
  - Limit contacts (also for temperature)
  - P(ID) controller
  - Timer for simple rinse processes
  - Complete cleaning with Chemoclean
- Plus package:
  - Current output via table
  - Automatic cleaning trigger
  - Process monitoring
  - Sensor live check
- HART® or PROFIBUS-PA/-DP
- 2nd current output for temperature, main measured value or actuating variable
- Current input for flow rate monitoring with controller shut off or for feedforward control

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Function and system design

Features of the basic version

Measurement of oxygen content

The oxygen content is displayed in mg/l or in %SAT. This is selected via the menu. The **temperature** is displayed at the same time or, if desired, not shown at all.

Calibration

The sensor COS21 is zero-current-free and only requires a **single-point calibration**. This takes place in water-saturated air or in air-saturated water.

Configuration

Different alarms are required depending on application and operator. Therefore the transmitter permits independent **configuration of the alarm contact and error current** acc. to NAMUR for each individual error. Unnecessary or undesirable alarms can be suppressed in this manner. **Up to four contacts** can be used as limit contacts (also for temperature), to implement a P(ID) controller or for cleaning functions.
Direct **manual operation of the contacts** (bypassing the menu) provides quick access to limit, control or cleaning contacts, permitting speedy correction of deviations.
The **serial numbers** of the instrument and modules and the order code can be called up on the display.

Additional functions of version HS

Automatic pressure compensation

Oxygen concentration is not only dependent on altitude but also on weather conditions (pressure). **Automatic pressure compensation** takes these fluctuations into account.

Additional functions of the Plus package

Current output configuration

In order to output wide measuring ranges while still achieving a high resolution in specific ranges, the **current output** can be configured as required via a table. This permits **bilinear** or **quasi-logarithmic** curves, etc.

Process Check System (PCS)

It comprises two independent safety functions:
- Errors in applications **without** control are detected by monitoring the limit beween plausible and implausible measured values, i.e. **the alarm theshold**.
- Errors in applications **with** control are detected by the **controller monitor** which monitors freely adjustable, maximum permissible time intervals and reference value overshoot or undershoot.

Live check

The live check issues an alarm when the sensor signal does not change over a defined period of time. This may be caused by blocking, passivation, separation from the process, etc.

Second current output

The second current output can be configured for temperature, main measured value or actuating variable.

Current input

The current input of the transmitter allows two different applications: controller shut-down in case of lower flow rate violation or total failure in the main flow as well as feedforward control. Both functions are also combinable.

Explosion proof versions for zone 2

Application of transmitter and sensor in hazardous area zone 2	Field housing COM253F with power supply 24 V
Application of transmitter as related electrical equipment in non-hazardous area or in simple pressurized apparatus; application of sensor in hazardous area zone 2	Field housing COM253F with power supply 230 V or Panel-mounted housing COM223F with power supply 230 V or 24 V

Measuring system

A complete measuring system comprises:

- The transmitter Liquisys M COM223F or COM253F in version HX or HS
- An oxygen sensor COS21 with integrated NTC temperature sensor
- A measuring cable COK21
- An immersion, flow or retractable assembly e.g. CPA442 or CPA475

Options: extension cable CYK71, junction box VBM
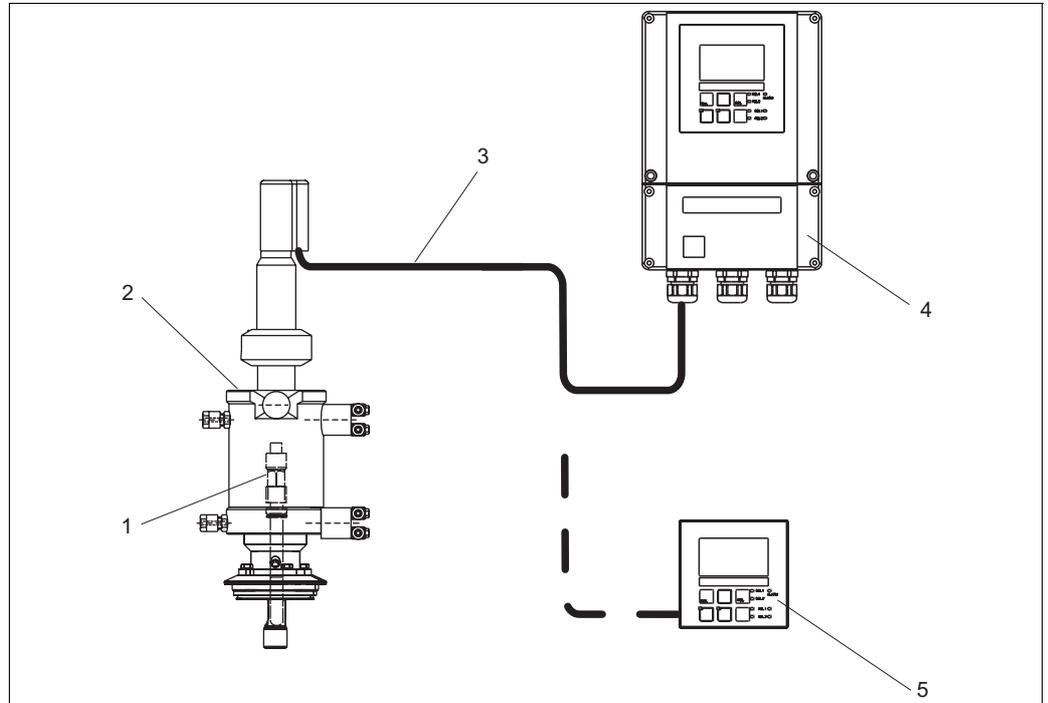
Complete measuring system Liquisys M COM223F/253F

1	*Oxygen sensor COS21*	*4*	*Liquisys M COM253F*
2	*Retractable assembly CPA475*	*5*	*Liquisys M COM223F*
3	*Measuring cable COK21*		

Input

Measured variables

Oxygen
Temperature

Measuring range

Oxygen concentration	0.01 to 20 mg/l
Oxygen saturation index	0 to 200 % SAT
Temperature:	–10 to 130 °C (14 to 266 °F)

Cable specification

Cable length:	max. 50 m (164 ft)

O_2 signal input

Signal current	0 to 650 nA

Binary inputs

Voltage:	10 to 50 V
Power consumption:	max. 10 mA

Current input

4 to 20 mA, galvanically separated

Load: 260 Ω at 20 mA (voltage drop 5.2 V)

Output

Current range	0/4 to 20 mA, galvanically separated, active
Error current	2.4 or 22 mA in case of an error
Load	maximum 500 Ω
Transmission range	Oxygen concentration Δ 0.2 to Δ 20 mg/l Oxygen saturation index Δ 2 to Δ 200 % SAT Temperature: Δ 10 to Δ 140 K
Resolution	max. 700 digits/mA
Isolation voltage	max. 350 V_{eff}/500 V DC
Overvoltage protection	according to EN 61000-4-5
Auxiliary voltage output	Output voltage: 15 V $\pm$ 0.6 Output current: max. 10 mA
Contact outputs	Switching current with ohmic load (cos φ = 1): max. 2 A Switching current with inductive load (cos φ = 0.4): max. 2 A Switching voltage: max. 250 V AC, 30 V DC Switching power with ohmic load (cos φ = 1): max. 500 VA AC, 60 W DC Switching power with inductive load (cos φ = 0.4): max. 500 VA AC, 60 W DC
Limit contactor	Pickup/dropout delay: 0 to 2000 s
Controller	Function (adjustable): pulse length/pulse frequency controller Controller response: PID Control gain K_p: 0.01 to 20.00 Integral action time T_n: 0.0 to 999.9 min Derivative action time T_v: 0.0 to 999.9 min Period for pulse length controller: 0.5 to 999.9 s Frequency for pulse frequency controller: 60 to 180 min^{-1} Basic load: 0 to 40% of max. set value
Alarm	Function (switchable): latching/momentary contact Alarm threshold adjustment range: O_2 / temperature: entire measuring range Alarm delay: 0 to 2000 s (min) Monitoring time lower limit violation: 0 to 2000 min Monitoring time upper limit violation: 0 to 2000 min

Power supply

a0003739

Electrical connection of the transmitter

|			
A	*Oxygen sensor COS21*	*G*	*Alarm (current-free contact position)*
B	*Signal output 1 oxygen*	*H*	*Relay 1 (current-free contact position)*
C	*Signal output 2 temperature/controller*	*I*	*Relay 2 (current-free contact position)*
D	*Binary input 1 (Hold)*	*J*	*Relay 3 (current-free contact position)*
E	*Binary input 2 (Chemoclean)*	*K*	*Relay 4 (current-free contact position)*
F	*Aux. voltage output*	*L*	*Current input 4 to 20 mA*
		M	*Power supply*

Note!
The device is approved for protection class II and is generally operated without a protective earth connection. The circuits "C" and "F" are not galvanically isolated from each other.

Connection of sensor

Connection of the oxygen sensor COS21:
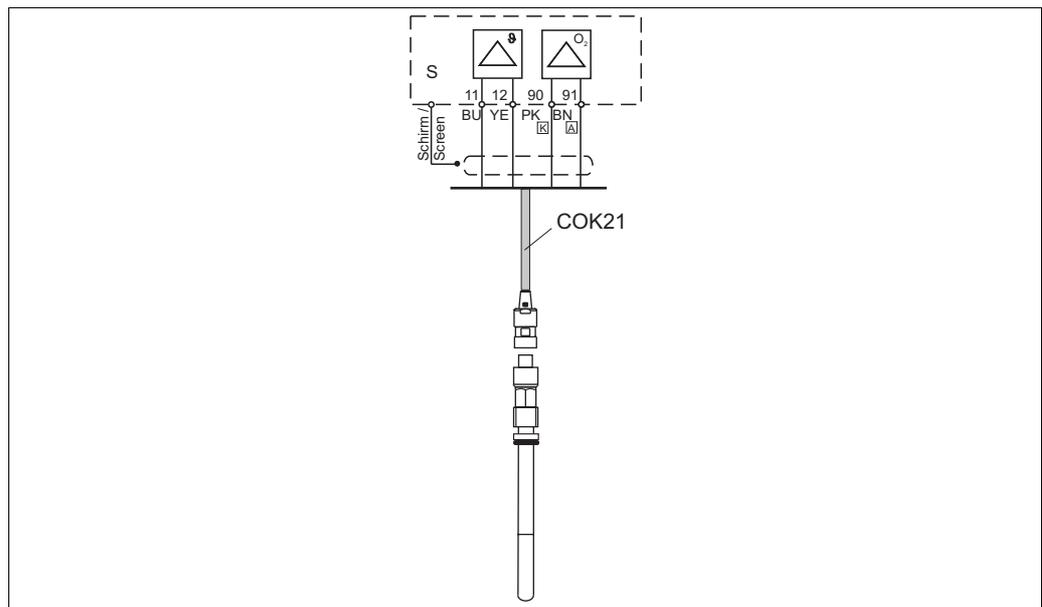
Connection of COS21 with cable COK21

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Power supply	Depending on ordered version: 100/115/230 V AC +10/–15 %, 48 to 62 Hz 24 V AC/DC +20/–15 %
Power consumption	max. 7.5 VA
Mains protection	Fine-wire fuse, medium-slow blow 250 V/3.15 A

Performance characteristic

Resolution	Oxygen:	0.01 mg/l / 0.1 % SAT
	Temperature:	0.1 °C

Deviation of indication[1]	Display	
	Oxygen:	±0.03 mg/l, ±0.3 % SAT
	Temperature:	max. 1.0 % in the range of -10 to +60 °C (+14 to 140 °F)
	Signal output	
	Oxygen:	max. 0.75 % of measuring range
	Temperature:	max. 1.25 % of measuring range

Repeatability[a]	±0.05 mg/l, ±0.5 % SAT

Temperature compensation range	0 to 50 °C (32 to 122 °F)

Pressure compensation range	500 to 1100 hPa

Altitude adjustment range	0 to 4000 m (0 to 13124 ft)

Salinity adjustment range	0 to 4 %

Slope adjustment range	COS21:	75 to 140 % (nominal 60 nA, in air, 20 °C (68 °F), 1013 hPa)

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1) acc. to IEC 746-1, for nominal operating conditions

Installation conditions
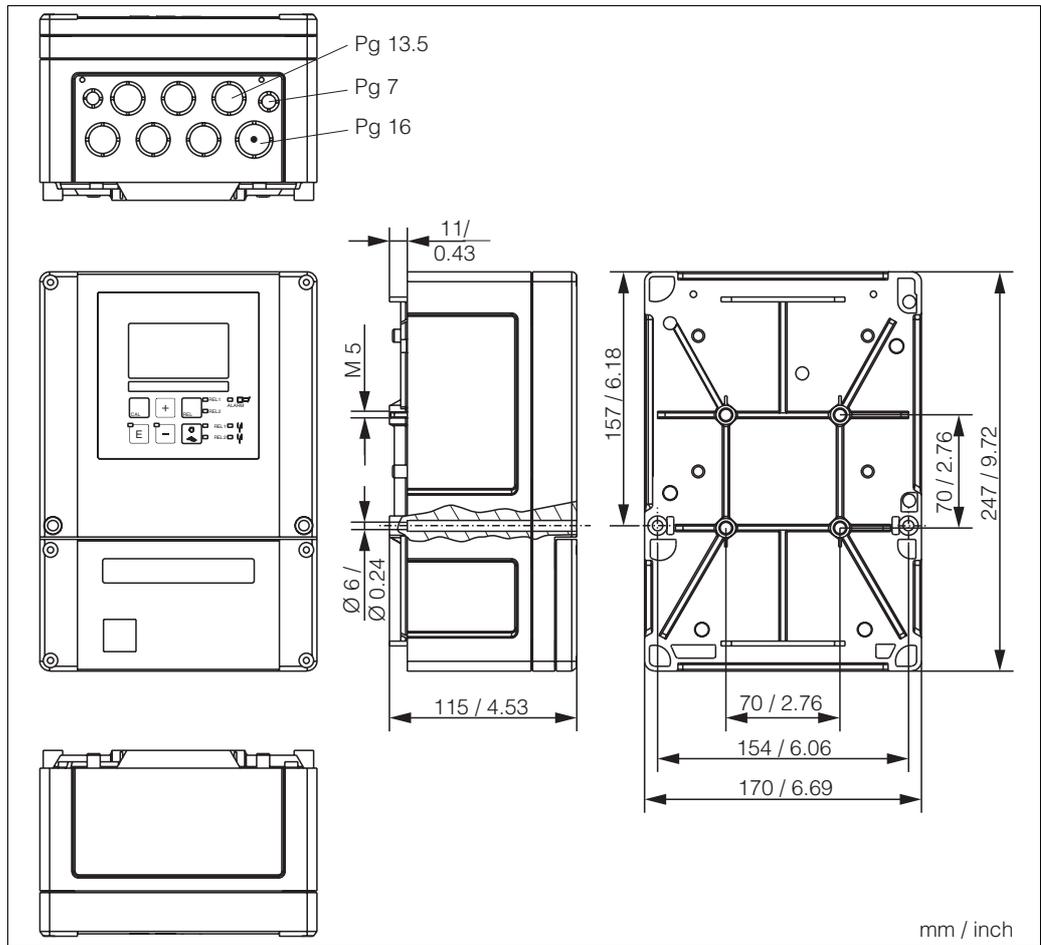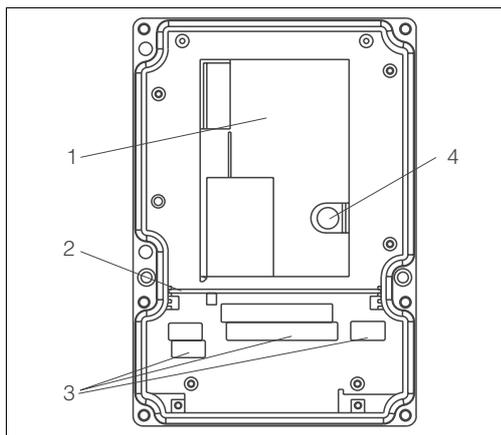
Field instrument

C07-CxM253xx-06-06-00-en-001.EPS

Mounting on pipes

1 - 3   Mounting screws and mounting plate
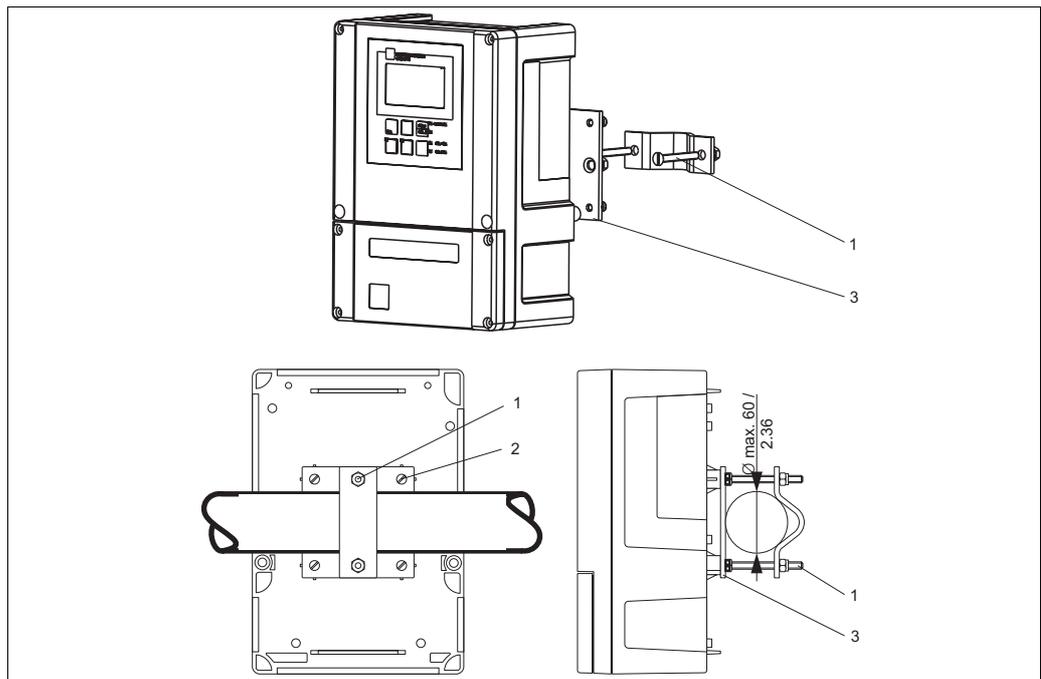
C07-CxM253xx-11-06-00-en-003.EPS

1   Removable electronics box
2   Partition plate
3   Terminal blocks
4   Fuse

Inside of field instrument

Wall mounting of the field instrument
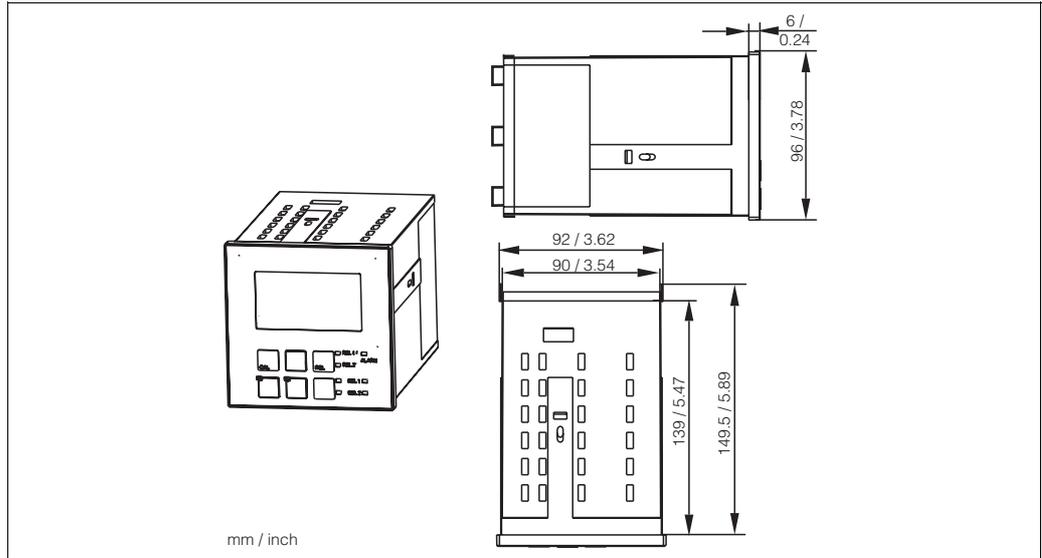
1   Mounting holes
2   Protecting cap
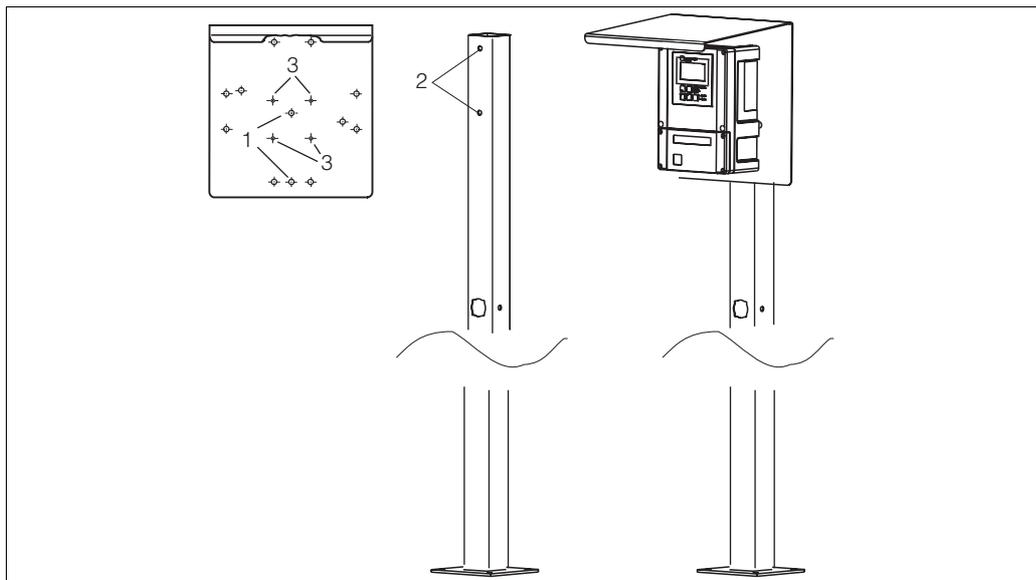
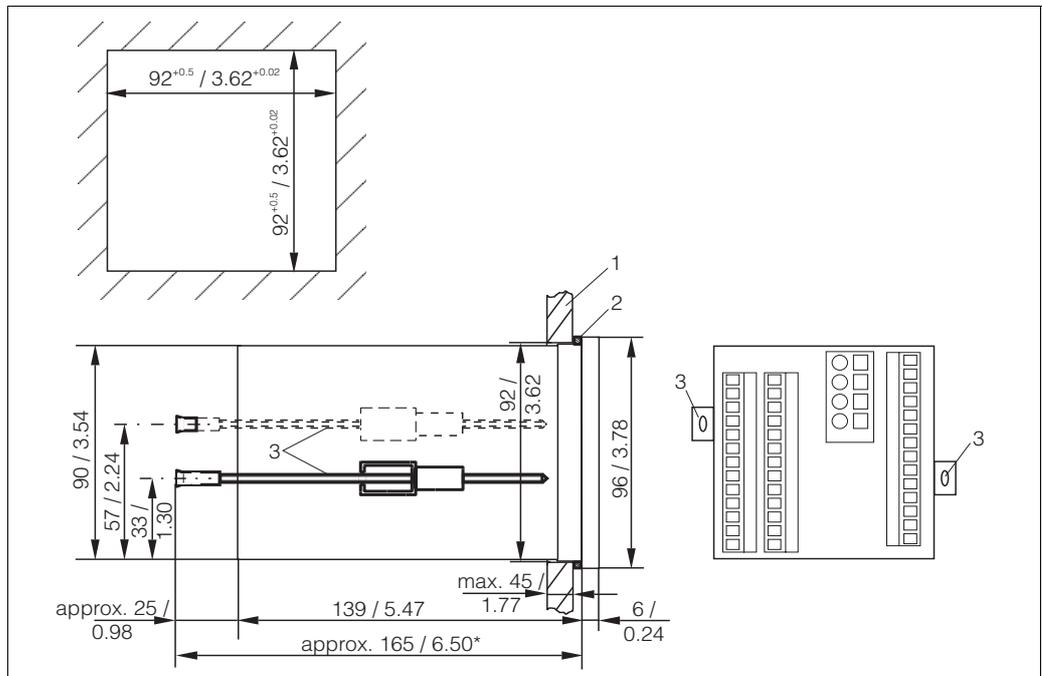*Mounting of the field instrument with mounting post and weather protection cover*

1 –3   Mounting holes

Dimensions panel-mounted instrument

C07-CxM223xx-06-06-00-en-001.EPS

Installation of the panel-mounted instrument

1   *Wall of control cabinet*
2   *Gasket*
3   *Tensioning screws*
*   *Required installation depth*

C07-CxM223xx-11-06-00-en-001.EPS

Environment

Ambient temperature	–10 to +55 °C (+14 to +131 °F)
Ambient temperature limit	–20 to +60 °C (–4 to +140 °F)
Storage and transport temperature	–25 to +65 °C (–13 to +149 °F)
Electromagnetic compatibility	Interference emission and interference immunity acc. to EN 61326: 1997 / A1: 1998
Ingress protection	Panel-mounted instrument: IP 54 (front), IP 30 (housing) Field instrument: IP 65
Relative humidity	10 to 95%, non-condensing

Mechanical construction

Dimensions	Panel-mounted instrument: 96 x 96 x 145 mm (3.78 x 3.78 x 5.71 inches) Installation depth: approx. 165 mm (6.50") Field instrument: 247 x 170 x 115 mm (9.72 x 6.69 x 4.53 inches)
Weight	Panel-mounted instrument: max. 0.7 kg (1.5 lb) Field instrument: max. 2.3 kg (5.1 lb)
Materials	Housing of panel-mounted instrument: Polycarbonate Field housing: ABS PC Fr Front membrane: Polyester, UV-resistant
Terminals	Cross section max. 2.5 mm^2 (14 AWG)

Human interface

Display elements
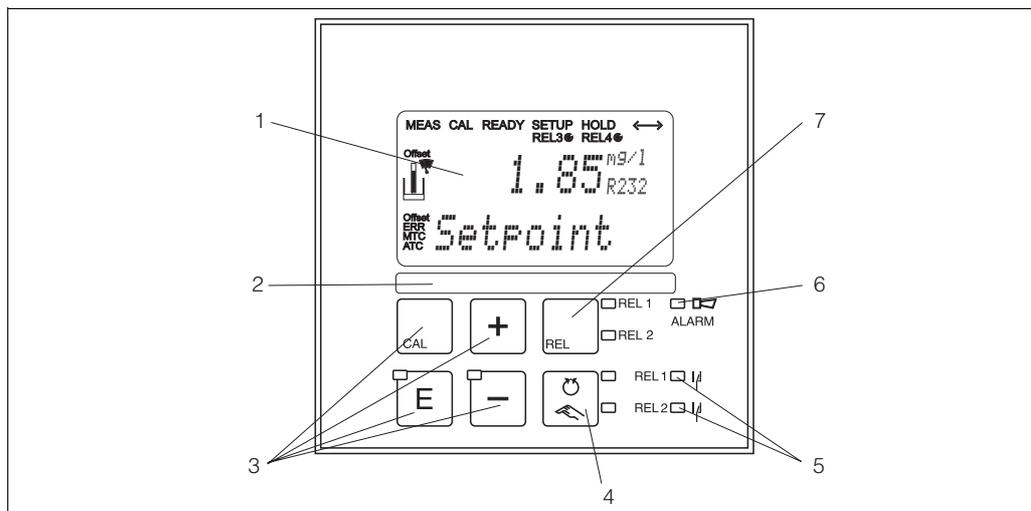
Operating elements

1   LC display for displaying the measured values and configuration data
2   Field for user labelling
3   4 main operating keys for calibration and device configuration
4   Changeover switch for automatic/manual mode of the relays
5   LEDs for limit contactor relay (switch status)
6   LED for alarm function
7   Display of the active contact and key for relay changeover in manual mode

The display simultaneously shows the current measured value and the temperature – the essential process data. Brief information texts in the configuration menu provide assistance with parameter configuration.

Instrument control functions   All instrument control functions are arranged in a logical menu structure. Following access code entry, the individual parameters can be easily selected and modified as needed.

Certificates and approvals

CE symbol

Declaration of conformity
The product meets the legal requirements of the harmonized European standards.
The manufacturer confirms compliance with the standards by affixing the CE symbol.

Ex approval for zone 2

Explosion protection for Zone 2

Version	Approval
COM253F-..6...	ATEX II 3G EEx nA[L] IIC T4
COM253F-..4... COM223F-..4... COM223F-..6...	ATEX II 3G [EEx nAL] IIC

Ordering information

Product structure

					Version		
					HX	Sensor COS21, basic functions	
					HS	Sensor COS21, with additional functions (Plus package)	

				Power supply; approval	
			0	230 V AC	
			1	115 V AC	
			2	230 V AC; CSA Gen. Purp.	
			3	115 V AC; CSA Gen. Purp.	
			4	230 V AC; ATEX II 3G [EEx nAL] IIC	
			5	100 V AC	
			6	24 V AC/DC; ATEX II 3G [EEx nAL] IIC for COM223F, EEx nA[L] IIC T4 for COM253F	
			7	24 V AC/DC; CSA Gen. Purp.	
			8	24 V AC/DC	

			Output	
		0	1 x 20 mA, dissolved oxygen	
		1	2 x 20 mA, dissolved oxygen and temperature/actuating variable	
		3	PROFIBUS PA	
		4	PROFIBUS DP	
		5	1 x 20 mA, dissolved oxygen with HART®	
		6	2 x 20 mA, dissolved oxygen with HART® and temperature/actuating variable	

			Additional contacts; analog input	
		05	Not selected	
		10	2 x relay (limit/controller/timer)	
		15	4 x relay (limit/controller/Chemoclean)	
		16	4 x relay (limit/controller/timer)	
		20	2 x relay (limit/controller/timer); current input	
		25	4 x relay with cleaning (limit/controller/timer/Chemoclean); current input	
		26	4 x relay with timer (limit/controller/timer); current input	

COM253F-				
				complete order code
COM223F-				

Additional functions of the Plus package

- Automatic corrrection of air pressure with concentration measurement, field A3
- Current output table, fields O33x
- Monitoring for sensor and process, function group P
- Automatic cleaning function start, field F8

Scope of delivery

The delivery of the field instrument includes:
- 1 transmitter COM253F
- 1 plug–in screw terminal
- 1 cable gland Pg 7
- 1 cable gland Pg 16 reduced
- 2 cable glands Pg 13.5
- 1 Operating Instructions BA246C/07/en
- versions with HART communication:
  1 Operating Instructions Field Communication with HART, BA208C/07/en
- versions with PROFIBUS communication:
  1 Operating Instructions Field Communication with PROFIBUS PA/DP, BA209C/07/en
- versions with explosion protection for hazardous area zone 2 (ATEX II 3G):
  Safety instructions for use in explosion–hazardous areas, XA194C/07/a3

The delivery of the panel mounted instrument includes:
- 1 transmitter COM223F
- 1 set of plug–in screw terminals
- 2 tensioning screws
- 1 BNC–plug (solder–free)
- 1 Operating Instructions BA246C/07/en
- versions with HART communication:
  1 Operating Instructions Field Communication with HART, BA208C/07/en
- versions with PROFIBUS communication:
  1 Operating Instructions Field Communication with PROFIBUS PA/DP, BA209C/07/en
- versions with explosion protection for hazardous area zone 2 (ATEX II 3G):
  Safety instructions for use in explosion–hazardous areas, XA194C/07/a3

Accessories

Sensors

- Oxymax H COS21
  Sterilizable sensor for dissolved oxygen
 Ordering acc. to product structure, see Technical Information (TI244C/07/en)

Assemblies

Cleanfit H CPA475
- Retractable assembly for installation in tanks and pipework under sterile conditions
- Technical Information TI240C/07/en

Unifit H CPA442
- Installation assembly for food, biotechnology and pharmaceuticals, with EHEDG and 3A certificate
- Technical Information TI306C/07/en

Connection accessories

Special measuring cable for COS21
- COK21; cable length 3 m (9.8 ft)
  order no. 51505870
- COK21; cable length 10 m (33 ft)
  order no. 51505868

CYK71 measuring cable
- non-terminated cable for the connection of sensors or the extension of sensor cables
- sold by the meter, order number: 50085333

Junction box VBM
- for cable extension
- with 10 terminals, IP 65 / NEMA 4X
- Order numbers:
  - Cable entry Pg 13.5: 50003987
 - Cable entry NPT ½": 51500177

Mounting accessories

- Weather protection cover CYY101 for mounting of field housing, for outdoor installation
 material: stainless steel 1.4031;
  order no. CYY101-A
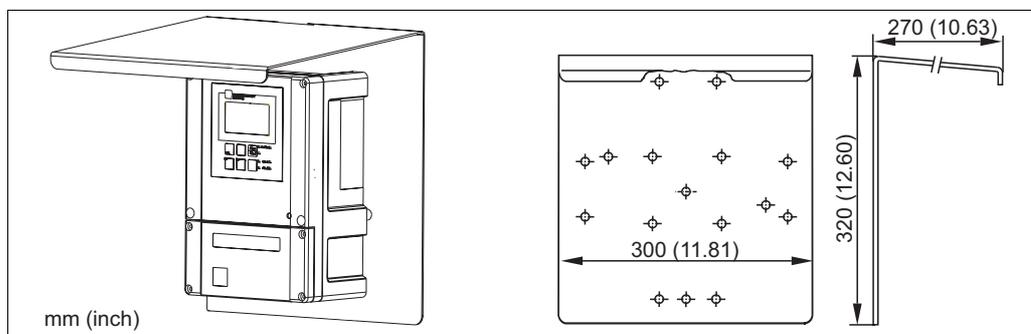
Weather protection cover for field instrument

- Kit for mounting of field housing on horizontal or vertical pipes (Ø max. 60 mm (2.36"))
  order no. 50086842

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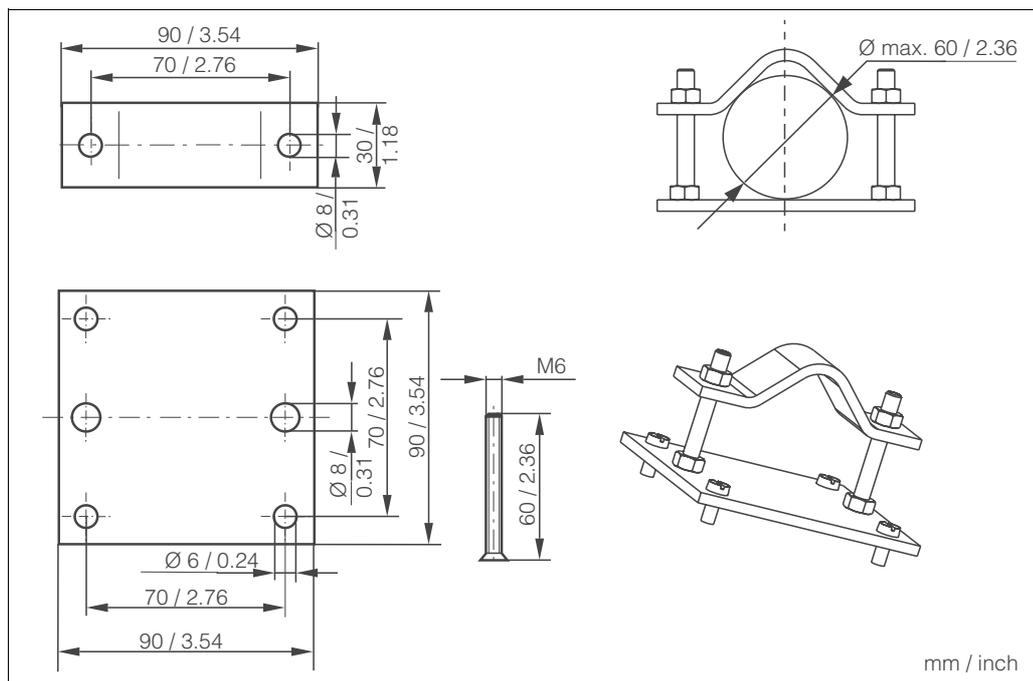
Pipe mounting kit

- Universal upright post CYY102
  Square post for mounting of field housing, material: stainless steel 1.4301 (AISI 304);
  order no. CYY102–A

C07-CYY102xx-00-06-00-en-002.eps
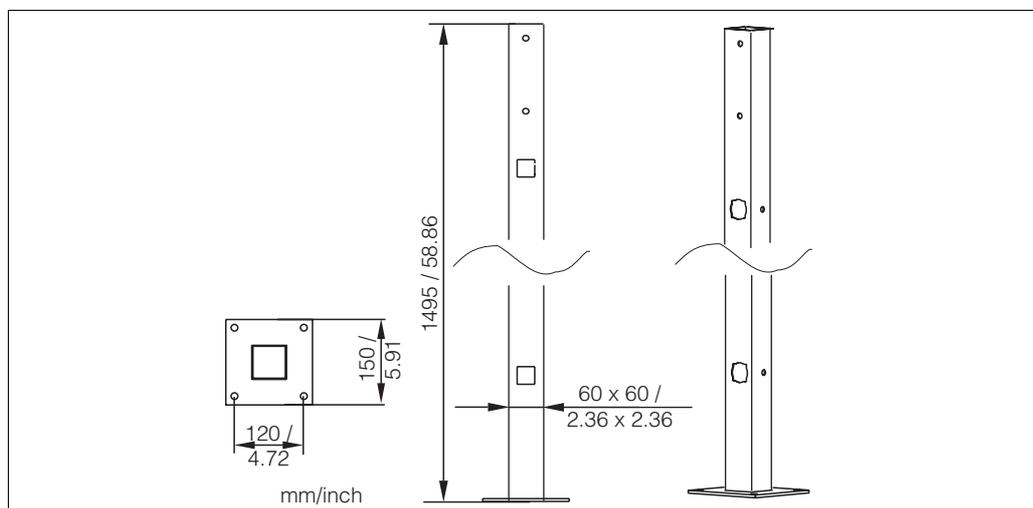
Square post CYY102

Optoscope

- Optoscope
  Interface between transmitter and PC / laptop for service purposes.
  The Windows software "Scopeware" required for the PC or laptop is supplied with the Optoscope. The Optoscope is supplied in a sturdy plastic case with all the accessories required.
  Order no. 51500650

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